

# INTERNATIONAL SEARCH REPORT

Internat Application No  
PCT/IB2004/051174

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 G02F1/1334

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CAPUTO R ET AL: "FORMATION OF A GRATING OF SUBMICRON NEMATIC LAYERS BY PHOTOPOLYMERIZATION OF NEMATIC-CONTAINING MIXTURES" JOURNAL OF EXPERIMENTAL AND THEORETICAL PHYSICS, AMERICAN INSTITUTE OF PHYSICS, WOODBURY, US, vol. 91, no. 6, 1 December 2000 (2000-12-01), pages 1190-1197, XP001038837 ISSN: 1063-7761 the whole document	1-4,6,7, 9-12
Y	----- -/--	5

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the International filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the International filing date but later than the priority date claimed

- \*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the International search

9 November 2004

Date of mailing of the International search report

21/12/2004

Name and mailing address of the ISA

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>EVGENIY E PASHKOVSKY ET AL: "NON-EQUILIBRIUM THERMAL BEHAVIOUR OF A MAIN CHAIN THERMOTROPIC POLYMER" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 14, no. 6, 1993, pages 1655-1659, XP000396258 ISSN: 0267-8292 the whole document</p>	5
Y	<p>PASHKOVSKY E E ET AL: "Non-equilibrium thermal behaviour of two main-chain thermotropic polymers" POLYMER UK, vol. 34, no. 23, December 1993 (1993-12), pages 4898-4903, XP002304695 ISSN: 0032-3861 the whole document</p>	5
A	<p>VILFAN M ET AL: "Deuteron NMR study of molecular ordering in a holographic-polymer-dispersed liquid crystal" PHYSICAL REVIEW E (STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS) APS THROUGH AIP USA, vol. 66, no. 2, August 2002 (2002-08), pages 021710/1-9, XP002304696 ISSN: 1063-651X the whole document</p>	5
A	<p>US 5 942 157 A (BUNNING TIMOTHY J ET AL) 24 August 1999 (1999-08-24) column 6, line 62 - column 9, line 35 column 14, line 62 - column 19, line 2</p>	1-7,9-12
T	<p>VELTRI A ET AL: "Model for the photoinduced formation of diffraction gratings in liquid-crystalline composite materials" APPLIED PHYSICS LETTERS AIP USA, vol. 84, no. 18, 3 May 2004 (2004-05-03), pages 3492-3494, XP002304697 ISSN: 0003-6951 page 3493, right-hand column - page 3494, left-hand column</p>	1-7,9,10

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 8

Claim 8 is directed to a composite material obtainable by a process which involves a first heating step, a second illumination step and a third cooling step. The first and third steps cause a phase transition of the liquid crystal from the nematic to the isotropic phase (by heating) and back to the nematic phase (by cooling): therefore, the first and third steps constitute a reversible process. However, as they take place with an accompanying temperature change, they are not isothermal. The illumination step, on the contrary, is carried out at constant temperature (see the description, p. 4) and is therefore isothermal; however, as it induces a polymerisation, which is irreversible, the second step is an irreversible process, too. As the description does not describe any other process or transition which is isothermal and reversible at the same time, as claimed in claim 8, it is not understandable which kind of transition should be searched. Furthermore, the expression "nematic isotropic phase" is meaningless, because a liquid crystal exists either in a nematic phase or in an isotropic phase.

Therefore, no meaningful search is possible for the subject-matter of the dependent claim 8.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

# INTERNATIONAL SEARCH REPORT

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## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 8  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No  
PCT/IB2004/051174

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5942157	A	24-08-1999	
		AU 4041597 A	20-02-1998
		EP 0958329 A1	24-11-1999
		JP 2000515996 T	28-11-2000
		US 6699407 B1	02-03-2004
		US 6677086 B1	13-01-2004
		US 6706451 B1	16-03-2004
		WO 9804650 A1	05-02-1998
		US 2003197157 A1	23-10-2003
		US 6667134 B1	23-12-2003
		US 2004091787 A1	13-05-2004
		US 2004089842 A1	13-05-2004
		US 2004137204 A1	15-07-2004